

SEE WHAT I MEAN

DESIGN AND
PRODUCTION OF
INDIVIDUAL
VISUAL AIDS

371/335
RAY

MARIAN RAY

SEE WHAT I MEAN

To Mother and Daddy

ACKNOWLEDGEMENTS

FOR QUOTATIONS

Page 8: A. L. Greenly, *'Psychology as a Sales Factor'* (Pitman); page 12: F. E. Farley, *'Visual Aids in the Schools'* (N.F.E.F.G.); Charles Fox, *'Educational Psychology'* (Kegan Paul); page 13: Mary Field, *'Visual Aid Year Book'* (Daily Mail); A. L. Stampa, *'Look and Listen'* (January 1949); page 15: Dorothy Quentin, *'Maiden Voyage'* (Ward, Lock); page 23: Thomas Hardy, *'Tess of the d'Urbervilles'* (Macmillan); page 24: Tommy Thompson, *'ABC of Our Alphabet'* (Studio); Aldous Huxley, *'Proper Studies'* (Chatto & Windus); page 25: G. P. Meredith, *'Aeronautics'* (April 1945).

FOR ILLUSTRATIONS

Page 46 (photo): National Federation of Educational Film Groups; page 52: Tommy Thompson, *'ABC of Our Alphabet'* (Studio); page 22: British Overseas Airways; London Passenger Transport Board; page 23: Jean Charlot, *'Art from the Mayans to Disney'* (Sheed & Ward).

SEE WHAT I MEAN

*DESIGN AND PRODUCTION
OF
INDIVIDUAL VISUAL AIDS*

BY
MARIAN RAY



CASSELL & COMPANY LTD
LONDON

CASELL & COMPANY LTD

Educational Department

51 Russell Square

London, W.C.1

and at

371.335
RAY

210 Queen Street, Melbourne

26/30 Clarence Street, Sydney

P.O. Box 9, Lower Hutt, N.Z.

1068 Broadview Avenue, Toronto

29 Adderley Street, Cape Town

122 East 55th Street, New York 22

15 Graham Road, Ballard Estate, Bombay 1

Islands Brygge 5, Copenhagen

Avenida 9 de Julho 1138, São Paulo

P.O. Box 959, Accra, Gold Coast

Bureau Ednl. Res. Research
LIBRARY KING COLLEGE
Dated \$20.12.58
Accs. No 1263

First published 1953

Printed by

W. S. COWELL LTD

AT THE BUTTER MARKET, IPSWICH, AND LONDON

F. 1152

CONTENTS

SECTION ONE

Design

- I. PRELIMINARY CONSIDERATIONS 8
Uses of visual aids. Need for specially designed material. Methods of use and their influence on design. Choice of appropriate material.
- II. DRAFTING 16
Rough drafting. Research. Copyright. Choice of medium. Number of pictures. Composition. Line. Continuity. Close-ups. Symbols. Diagrams. Tone and Colour.

SECTION TWO

Production

- III. WALL-PICTURES AND CHARTS 30
Wall-pictures in ink. Cut-paper charts.
- IV. FILMSTRIPS 41
Drafting. Dimensions. Drawing. Tracing. Painting. Use of 'cels'. Lettering.
- V. LANTERN SLIDES 47
Hand-drawn slides. Mounting. Lettering.
- VI. LETTERING 49
Size. Style. Spacing. Lettering Pens and Stencils.
- VII. DRAWING FOR PRINTED REPRODUCTION 55
Ink drawings. Scraper Board.

INTRODUCTION

THE VALUE OF VISUAL AIDS is becoming increasingly recognized and special facilities for their use have been established in many schools and other educational centres, but there is need for much thought, experiment, and greater discrimination both in the design and use of visual aids if they are to yield the maximum educational benefit, if standards are to improve and new possibilities be realized.

Production of personal visual materials gives an insight into both the problems and possibilities of their design, production and use, in addition to the value of the material itself which may meet particular individual or local needs in a way which commercial productions cannot attempt.

Some of the factors which should be considered in designing such materials are outlined here, and methods of production which have been specially selected to suit those with limited time and talent, and a minimum of expensive materials and equipment at their disposal.

SECTION ONE

Design



1

PRELIMINARY CONSIDERATIONS

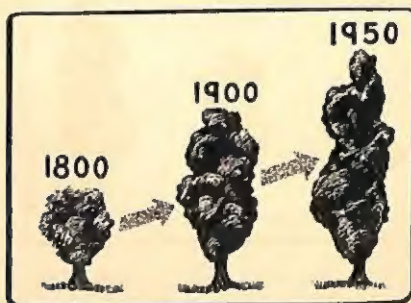
WHEN A VISUAL AID is placed before a class it provides a focal point to which its attention is immediately drawn, more especially if the visual aid is projected, when the brilliant illumination of the screen in dimly-lit surroundings compels attention. This gives an initial advantage, but if any educational benefit is to be derived from the pictures it is not sufficient that attention should be drawn to them; it is also necessary that curiosity shall be kindled, provoking a closer scrutiny of the pictures; points relevant to the lesson must be noticed and interpreted so that generalizations may be drawn from them and applied to further learning and activity.

We may see all there is to be seen and learn nothing, or, like Sherlock Holmes, we may look at a little and gather quite a lot.

A. L. GREENLY

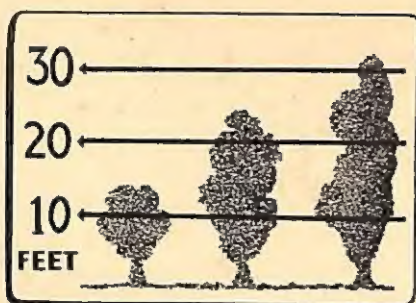
It is, of course, for the teacher to ensure that the material is in fact studied, understood, and assimilated, but a correctly designed visual aid can do very much to help him in this work. By presenting its subject in an attractive, thought-provoking manner, it can help to arouse interest and curiosity; by clarity of content it will help to avoid and overcome confusion; the selection of appropriate material and correct presentation will direct attention and thought along appropriate lines; and a visual aid may help the teacher by making provision for summing up and questioning, and may give an impetus to further enquiry.

Every picture, by its design, will inevitably give a bias to the response which it evokes:

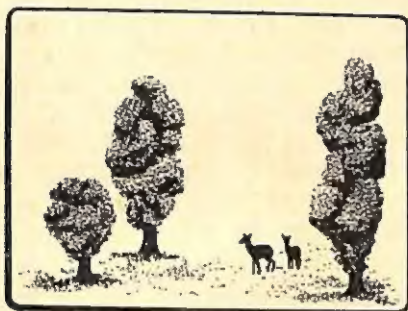


A picture of three trees shown this way suggests a comparison of three stages in the life of one plant.

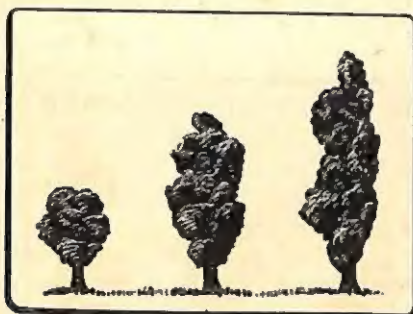
PRELIMINARY CONSIDERATIONS



The same three trees shown in this manner leads the viewer to make a comparison of their heights.



With this picture it would be impossible to compare their heights accurately because they are not in the same plane, or to compare their ages because these are not indicated. In any case, the pupil's interest would probably be centred on the deer. On the other hand, this might be an ideal picture for another purpose, such as story illustration.



A 'neutral' picture which can be used with different commentaries to illustrate several points usually does not make any of them very effectively. Very probably it will suggest different things to different people and the idea which the teacher wishes to illustrate will not necessarily be among them.

It is obvious, therefore, that visual aids must be specially designed for the particular educational purpose for which they are required, for while something may be learned from almost every picture, school teaching is not a random proceeding, but progresses systematically, and visual aids must help this process and not hinder by introducing irrelevant matter and ideas.

Only a clearly defined aim will enable the producer to select and prepare valuable material and eliminate that which is less suitable, and the teaching purpose will in fact have some influence on almost every part. It is therefore necessary, before beginning the production of a visual aid, to consider not only the proposed factual content in itself, but also its significance to the subject as a whole and the point of view from which it is to be approached; it must be decided at which points of the topic visual aids will be most valuable, how they will be used, and the time that may be allotted to a study of them; exactly what ground they are to cover, and with what end in view.

Too many pictures can become as monotonous and confusing as too many words, and it is therefore wise to limit the use of visual aids to those points where they can be of greatest benefit. Some such points may be: where an idea of the appearance of a subject is essential to the lesson (for example, the diagram of a theorem); where the subject is far removed in space (geography) or time (history); where it is inaccessible by reason of its size, whether large (a whale) or small (microscopic objects, and demonstrations of delicate manipulations which cannot be clearly seen by a whole class at once); where processes are too speedy or too slow for convenient study (flight of a bird, growth of a plant). In such cases visual aids reduce time and space and life to comprehensible dimensions for the classroom and make possible the teaching of subjects otherwise impossible or difficult to cover. In this way visual aids can contribute to a broadening and extension of education, and in many cases are already doing so.

There are occasions when a visual aid can help to give an understanding of a non-visual subject, for instance, sound-waves or an electric current. Even when visual aids are not perhaps essential they may still give a quicker or a better understanding than words alone: where verbal description is inadequate; where drawings or diagrams disclose new aspects of what may be a quite

Uses of Visual Aids

familiar subject; where complex relationships and developments must be grasped; where a vivid impression is required to focus attention, arouse interest, provide food for thought and imagination, and stimulate activity.

In short, visual aids used where (1) they are essential to understanding, (2) they save time, (3) they improve the quality of learning, are an educational *economy*, and this is a good criterion by which to judge both their design and use.

The mere fact that lesson material is put into visual form does not in itself guarantee that it will be any clearer to the pupil; too many pictures, ill-chosen illustrations, badly-designed diagrams, can be just as confusing as too many or ill-chosen words. Moreover, three poor illustrations of the same subject will not, by compensating for each other's deficiencies, give the same result as one properly designed visual aid.

Like words, visual aids are educational tools, and like words, they may be vivid, clear, or dull and muddling, and may be used well or ill according to the skill and discrimination of the teacher. Both have their limitations, and either, on occasion, may be indispensable. It is possible to instruct by means of pictures alone, just as it is possible to teach solely by words. In school instruction, however, visual aids will normally be only one means by which a lesson will be taught, and the manner in which they are to be incorporated into the lesson and used, will have a bearing on their design. Conversely, a visual aid which is designed for use in one way may not be so effective if employed in another manner, and so visual aids must be selected which are appropriate to the proposed method of teaching. It is, of course, impossible to cater separately for every individual occasion, but two broadly defined methods of use, each requiring a different type of visual material can be observed.

First, there is the lesson in which the matter is given verbally and pictures are introduced as reinforcements of the narrative, or perhaps to short-circuit lengthy descriptive passages. This type of lesson requires primarily pictures of *things*—pictures whose purpose is simply to show the appearance of the objects they portray. These pictures will be more or less isolated from one another, having no apparent continuity. Functions, actions, relationships, and so forth, will be explained verbally by the teacher who, in this type of lesson, is the active and vocal element—the aid is an aid

*It was a thing to see,
not hear.*

BYRON

*Things seen are mightier
than things heard.*

TENNYSON

Words and Pictures

The method of synthesis has been the general traditional method of verbal teaching. By adding to known simple facts as experience is gained, mental concepts are built up, perfected and related to much other experience. The vivid images flashed on to the cinema screen accompanied by natural sound and explanatory commentary can present in a few moments a very real and very complete picture relating what is new in many ways to familiar objects or experience. The object of the teacher in getting such a presentation fully comprehended and firmly knit into the body of the pupil's previous knowledge is probably best achieved by analysis of the new experience. At any rate many teachers are doing it in this way . . .

F. E. FARLEY

With combined visual and aural stimuli the subject attends to one, not to both.

CHARLES FOX

A good sequence strip commands attention like a motion picture, because although the pictures are static, each is a development of the preceding one, and the mind is busy with the flow of ideas. 'I could understand this strip,' a man once said to me during a lesson, 'if only the instructor would stop talking'.

A. L. STAMPA

to teaching. The 'lantern-lecture' typifies this style of presentation and it is one to which lantern slides are very well adapted since they can be easily arranged and re-arranged to suit the varying requirements of individual lectures.

At the other extreme is the lesson in which the instruction is given in pictorial form and, after suitable preparation, the visual aid is presented directly to the pupils, providing a basis for subsequent analysis and discussion. This visual aid must be designed as a direct aid to learning and must show not only what objects look like but also what they do, how they do it, what is their purpose and importance, and how they are related to each other and to other things—in other words, the visual aid in this case is not only a picture of things but a picture of an *idea*, and it must be designed in such a way that the idea will become apparent as a result of a study of it; the pupils must be able to follow the thread of the argument from one stage to another and so close continuity and unity of the whole is characteristic.

The majority of lessons probably fall between these two types, the predominantly verbal and visual approaches, and in them visual aids are neither dominant nor accessory but take their place alongside other teaching methods as and when required. It therefore has to be decided at the outset how much, and which parts, of the lesson are to be covered by the visual aid, and how much left to the teacher.

While visual aids do not constitute a complete lesson in themselves, they are nevertheless a distinct part of a lesson and should not be a mere visual transcription of the accompanying verbal or other teaching. It is necessary to draw a distinction between that repetition, summing-up and revision which has an educational value and mere duplication, which is a waste of time at best, and at its worst produces a kind of duet of visual and verbal teaching, the elements of which, both demanding attention at the same time, are mutually antagonistic and result in an unpleasant conflict and confusion. Rather should visual aids be allowed to fulfil that part of the lesson which has, with good reason, been delegated to them, the object of accompanying captions or commentary being to further and direct a study of the pictures.

The difference between these two extreme types of presentation is really one of degree, since it is impossible

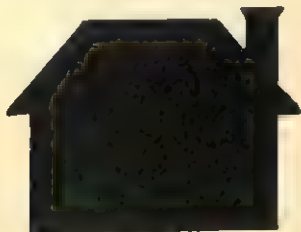
PRELIMINARY CONSIDERATIONS

to make a picture of any thing without reference to some point of view or idea concerning it. The picture maker will naturally produce a representation of the subject as he observes and interprets it. For teaching purposes it is therefore of first importance to select illustrations which not only depict the object under discussion but also show clearly and perhaps emphasize those aspects of it which are significant to the lesson, and further, one in which other and irrelevant points are excluded or at least subdued.

Some educational films are still being commended for having an 'informative' commentary, but this is very out of date. A long fifteen years or more ago it was a tenet of educational film-making that a commentary should direct the eye without giving information.

MARY FIELD

Take, for example, pictures of a house:



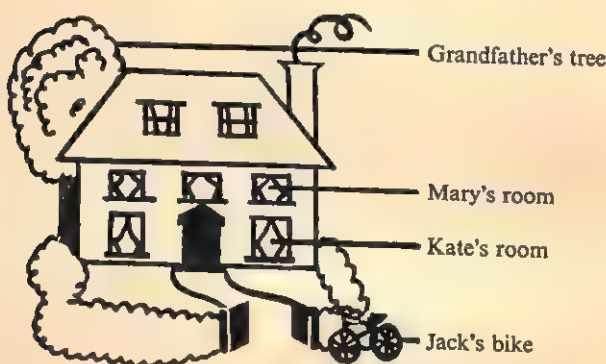
This is about the simplest picture of a house that it is possible to make. From it we learn that it is a house, and nothing more. If we want to describe the number of houses in a city, that is probably all we wish to convey and it is then better to use this simple outline than a detailed picture which will make us take an interest in the building and its occupants, because these things have no bearing on our argument and cause attention to wander from it.



To teach architecture a simple outline of a house is useless. We need a picture from which we can learn all about its structure, very precisely and in detail. This is reflected in the quality of architects' drawings which are made in very fine, clear lines exactly to scale.



The artist's picture tells us about the proportions of his house, its line and form, colour, and the texture of stone and pattern of bricks and tiles. He sees it in relation to its setting, perhaps the cool blue shade of nearby trees, and warm tones of sunshine on the walls.



Our house has a personal significance. In it we see my room and yours, Jack's bike outside the gate, the tree that grandfather planted. Note that since the idea of personal associations is abstract it is indicated by words.

The type of pictures used must also be suited to some extent to the age of the children for whom they are intended. For very young children we should probably need a rather simple picture of a house from which we could learn simple things such as: it is a little house; it has two windows and a green front door; and perhaps we may also guess that there is somebody at home because there is smoke coming out of the chimney. Also, we gain the impression that the occupant of such

PRELIMINARY CONSIDERATIONS

a nice, clean, bright, little house must be a pleasant, friendly person, because by all the laws of once-upon-a-time the wicked and unsociable live in gloomy woods and bleak castles. As we grow up such faith is modified, but it is surely not lost entirely, and this makes it possible to create in a picture an atmosphere which is appropriate to the subject-matter. In a well-designed visual aid this mood will be preserved throughout the composition, style of picture, colour scheme, lettering and even in minor details.


Perhaps all nice people keep a fragment of their childhood with them to guard against disenchantment.

DOROTHY QUENTIN

HEAVY



FAST

Precisely 

SHADOW

 **Circus!**

This must not be thought of as a necessarily disturbing element; although often made use of in this way in propaganda and entertainment pictures, identical principles can be called upon to suggest a feeling of calmness, neatness, cleanliness, precision, good taste, or even a clinical impersonality, which subtly helps to create an attitude of mind sympathetic to the subject.

2

DRAFTING

WHEN THE NATURE of the proposed visual aid is established a rough draft can be prepared, consisting probably of annotated thumb-nail sketches, labels, captions, references, and sometimes it may be found helpful to draft teaching notes at the same time.

It will be found necessary to keep within firm boundaries and resist all inviting side issues if the thing is not to develop beyond control and lose the forcefulness which results from a steady and logical pursuit of the objective. Before drafting has proceeded very far the need for research will make itself felt. Research constitutes a major part of the production of any visual aid because, however well the expert may know the facts of his subject, the visual aid can only be built up from visual data. Verbal description, memory and imagination are insufficient as a basis for drawing a picture of even the commonest objects. If you doubt this, try to draw a telephone box without looking at one first. This will show you the kind of information that is required for the construction of visual aids.

The careful research which underlies all visual aids is a lengthy and a costly business but has an educational value which is reflected in the finished product. It forces us to refer back to concrete reality, or as near to it as we can get, and this provides a useful check of facts, and is also responsible for the vivid quality of the impressions gained from visual learning. The production of a visual aid may sometimes be introduced as an activity in which a class can co-operate, and the 'finding out' stage has then an additional value.

It must be pointed out that all published material is copyright and should not be incorporated into other visual aids without permission of the owners. A fee or acknowledgement of source may be demanded.

It must be decided what form the visual aid is to take. If only a single picture is involved, it may be the subject of a wall-picture or a lantern-slide; a sequence—stages of development or a chain of cause and effect—will make a filmstrip; while more complex relationships are

Research



Copyright

Media

perhaps better shown in a chart. Sometimes part of the material can be better shown in a related visual aid of a different type, for example, a map to be used in conjunction with a filmstrip.

The first step in drafting is to break down the factual content into convenient units. In doing this, it must be borne in mind that the size of the pictures is more or less determined for each medium and the quantity of their content is related to this factor. The amount of material which it is thought desirable to put before the class at one time, and the length of time which will be necessary to study it, must also be remembered, and all these considerations taken in conjunction with each other will determine the number of pictures to be used. The picture measurements for each type of visual aid are given in subsequent chapters. If the pictures are to be projected it is, of course, the size of the projected image rather than that of the actual drawing which is important in this connection. In addition, the distance from which the pictures are to be viewed must be taken into account. The teacher standing, as he usually does, in front of the class, is in an advantageous position for viewing his visual aids and should make sure that they are clearly visible to all his class by viewing them from the back of the room. The difference in viewpoint has a greater effect on visibility than is sometimes realized. Particular care should be taken to ensure that lettering is legible, and adequate space must be allocated for labels and captions in the original drawing. These may take the form of sub-titles indicating sections of a film-strip or chart; titles or captions of individual pictures; labels of items in a picture, or an integral part of the picture, such as conversation in a 'balloon'. Written matter must, of necessity, be brief, and it is not necessary to label every item in a diagram if they are clearly drawn and easily recognizable.

Besides determining the content of the pictures, the manner of their presentation must be considered. The designer has under his control a number of factors—composition, line, colour, and so on—by means of which he can vary the emphasis and significance given to each part of his work, and which, wisely used, enable him to achieve his aim—a picture suited to its particular teaching purpose. While it is possible to describe principles underlying the use of these factors, no definite rules for their application can be laid down because

they must be employed according to the needs of each individual case, and what is right in one instance may be wrong in another.

Composition

'Composition' embraces the arrangement of objects, lines, colours, within a picture. These can be varied either by a re-arrangement of the objects or by a shifting of the position from which they are recorded—the 'camera angle' of the photographer—which has a similar effect. The composition of a teaching picture should be such that the eye is led immediately to the points of first importance, and the arrangement of subsidiary details and refinements to be revealed by a closer study should support the central theme without rivalling in dominance, so that the various parts constitute a coherent whole. A large number of unrelated items are difficult to grasp; they should be reduced to a smaller number of groups, and numbers of separate trivialities scattered about the picture should be avoided.



What is this picture about?

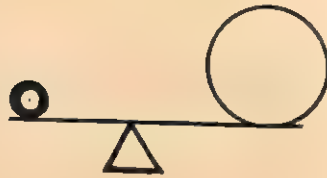
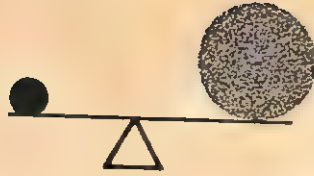


It shows the products derived from cotton fibre, seed and hull. The improvement is brought about by separating the three categories and grouping them within defined limits. Also by using the colour for a definite purpose instead of merely daubing. In the second picture the blue and black backgrounds separate the materials from the products and both act as a foil for the objects shown on them. The condition of the first picture is not improved, but made worse by the addition of colour.

This is a matter of common sense as much as of art, but if the picture is to be pleasing to look at, it must have balanced proportions as well as a logical arrangement. Lack of balance in a composition will be a source of irritation to the observer, whereas the eye can rest on a balanced composition without any sense of tension.

'Balance' does not necessarily imply a strictly symmetrical arrangement for, as a small but heavy weight can be balanced by a larger mass of lighter material, so a 'heavy' line or tone, or a brilliant colour, can be balanced by the correct proportion of 'lighter' lines or colours.





Balance between two unequally 'weighted' objects can also be achieved by adjusting their positions relative to a common centre, in the same way in which two children of unequal weight can adjust their positions on a see-saw to make it balance. The more prominent object must be brought nearer the centre.



Naturally, formal symmetry gives this equilibrium in the greatest degree and confers a static quality and a sense of stillness to the composition. Used with delicacy and a certain restraint it gives dignity and tranquility found, for example, in Georgian architecture and many fine typographical layouts, but if over-emphasized it produces a funereal atmosphere most appropriately applied to tombstones and little else. Rhythmic balance on the other hand gives an impression of movement and life which captures the interest, though the desirability of indicating violent movement in a still picture is a debatable point.

The eye tends to follow lines. A line encircling the

picture will tend to confine the eye within its boundaries and concentrate attention on it. A regular figure, especially a circle, sphere, or series of concentric rings has this property in the highest degree and this is the principle underlying the design of the bull's-eye target, the Belisha beacon, and the necessity for special provisions for camouflaging the eye often found in animals. In visual aids such a line is already provided by the edge of the picture. Within it, as far as possible, the lines should direct the eye as may be required, either from subsidiary objects to the principal one, or perhaps from one object to the next. No line or caption should cut across the composition unless with the express intention of arresting attention at that point.

In addition to the composition of individual pictures, the relationship of each picture to adjacent ones is important, both with regard to the logical development of the theme and the visual continuity which should support it. The story should run smoothly from one picture to the next and uniformity of style is helpful in this respect, but a certain amount of variety is also sometimes desirable, to break the monotony of a long sequence of pictures. A succession of photographs may be clarified by an occasional diagram or caption; and diagrams may be enlivened by the interpolation of pictures and photographs. The transition from one form to another must be carefully negotiated so that the relationship between the two is immediately obvious, and the same care must be applied in passing from distant views to close-ups. Close-ups give both magnification and an effect of proximity which is helpful in studying detail but necessarily limits the field of view so that their location in relation to the wider pictures must be established, either by superimposing them upon it, or showing first the distant and then the nearer view.

Symbols and colours, once adopted, must be used consistently throughout the production, and so they must be carefully chosen. They will have to take their place in many different situations and adaptability is therefore essential.

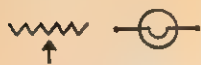
Symbols have been used by primitive peoples all over the world and all down history to the present day, and they are still employed perhaps more commonly than is generally realized; in electricity, chemistry, mathematics, botany, cartography, music and road signs, to name a few instances.



Continuity

Close-ups

Symbols



They will appeal to the teacher who is making his own visual aids for much the same reason, presumably, that they appealed to the cave-man; that is, because they happen to be one of the simplest and most direct methods of recording an idea and conveying it to others, and the success with which they carry their message depends upon a lively mind rather than a skilful hand.

The chief requirement of a symbol is that it shall be instantly recognizable. A very simple representation will serve this purpose. Symbols of primitive peoples consisting of a few lines only are still recognizable today in any part of the world. Because the principal factor in the recognition of an object is its outline, the symbol will probably be either an outline or silhouette. Where several forms exist, the most typical or familiar should be chosen; one subject may require different symbols for different stages, such as wheat—flour—loaf. Figures such as sacks or boxes which might contain anything should be avoided where any possibility of confusion exists, and symbols should be as different from one another as possible so that they may be easily distinguished. If it is necessary to indicate different categories of the same subject they may be given distinguishing colours.

Where particular identification is required great ingenuity can be used. The principle is that of the cartoonist, who seizes upon the prominent characteristics of his victims and emphasizes them so that there will be no mistaking their identity. This again is a very well-worn practice, having behind it a long tradition of totem-poles, shields, flags and other heraldic devices originating from the need to distinguish friend from foe; and the signs of trades and professions which originated from tools displayed outside business premises to indicate the trade of the occupant to an illiterate market. The painted signs, similar to inn-signs of today, which succeeded these in Roman times gave rise to the present-day paper poster, and we still have uniforms and marks of rank, and trade-marks used throughout industry. These make a fascinating study, but the essential method was perfected in the earliest times and has advanced not at all since then, for the art lies not in the selection of those essential characteristics which are so expressive, and what could one ask more than thin wavy

DRAFTING

lines for water, a hemisphere for sky, a combination of the two for rain? And the Eskimo 'white man'—a little pin-figure in a top-hat, carrying a gun with fixed bayonet—is surely the epitome of Western civilization!



Sky



Water



N. America



Egypt



Mesopotamia



China



White Man

Symbolism of abstract and qualitative subjects is more difficult, though here again primitive peoples were often surprisingly successful.



Many



Friend



Trinity

Colours may be used symbolically to represent abstract qualities, as red for danger, heat; blue for cold; purple for royalty, and so on. Modern commercial art and advertising abounds with indications of quality suggested by means of colour, line, style, and composition.

The extreme of abstract symbolism is found in the alphabet, for instance, in which the original pictorial symbols have become entirely conventionalized both in shape and meaning. An increasing degree of abstraction can be traced through pictures, diagrams, and symbols to writing, and many visual aids have, in fact, greater affinities with words than with pictorial art in that they are primarily used to express factual rather than visual properties. Art, both pictorial and literary, conveys

... a novel is an impression, not an argument.

THOMAS HARDY

At Altamira and in the painted caves of the Dordogne there are paleolithic bisons that might have been drawn by Degas. On the walls of the rock shelters of a later age there are neolithic figures of men and animals that might have been drawn by a child of seven. And yet all the evidence conclusively shows that the men of the new stone age were incomparably more intelligent and accomplished than their Magdalenian ancestors. The seeming degeneration of neolithic art is in fact an advance, for it marks an increase in the power of generalization. When he drew his bisons the paleolithic man was simply putting an outline round his visual memories. The neolithic artist worked in a different way. What he set down was a set of hieroglyphic symbols, each representing an intellectual abstraction. A circle—that stood for head; an egg for body; four lines for arms and legs...

ALDOUS HUXLEY

When he drew pictures on the walls of his cave, or wove a design into a piece of cloth, that was Art. When he drew ideas into his pictures to be conveyed to others, he had begun to write.

TOMMY THOMPSON

experience, partly sensory, partly emotional—one can almost 'feel' the painted velvet in a picture, the warmth of painted sunshine, the sensations of the hero in a book. Experience takes place in time; this is comparatively easily suggested in a novel or a film, but it is interesting to notice how a haunting sense of time (and movement, with which it is allied) is characteristic also of many great pictures—the Mona Lisa has just been amused, is just going to smile. This property is one of the great values of visual aids (particularly films) since it can bring to children a sense of experience wider than they would normally know; experience of other lands and other people's lives and many other things.

But visual aids may also be primarily intended to impart information rather than give an impression. The visual appearance may be only broadly indicated, distorted, or even omitted altogether. In diagrams ideas take precedence over the visible form. These simplified pictures in which the significant features only are indicated are often easier to 'read' than a more complex representation, but on the other hand, if they depart too widely from the appearance of their subject it may be difficult to refer back again to the actuality which they represent, and any knowledge gained will be valueless unless the connection between the two is clearly grasped. In designing a diagram therefore one has to decide what degree of simplification is desirable and how it is best introduced. It may be well worth giving extra space to a gradual transfer from 'real' to diagrammatic representation or it may be helpful to indicate the outline or keypoints of structures which have no immediate importance in order to establish the position of the part under consideration, but these should be lightly drawn and without much elaboration so that the important features may stand out.

All simplification involves some degree of distortion and the extent to which this is allowed to influence drawing, location of parts, and colouring, must be determined at the outset and should be more or less consistently adhered to.

Colour and tone are perhaps the most valuable instruments of the designer in giving the correct emphasis to the various parts of his work. Colours in the strict sense are the different hues—red, green, etc., while tone is the degree of lightness/darkness either of a colour or of greys from black to white.

Tone and Colour

In inanimate nature tones and colours are merely the outcome of chemical and physical properties, but in living things, both plant and animal, they are also utilized for their own sake, for here they have a value in themselves—a value in relation to the observer. They may be used for either of two purposes, concealment (camouflage) or advertisement (for instance, the bright colours of flowers which attract insects). The difference between these two opposites is not due to the particular colours used, but to the manner in which they are employed—that is to say no colours are conspicuous or inconspicuous as such, but only in relation to a particular setting: a lady-bird sitting on a tomato is less obvious, chromatically speaking, than a fly in the ointment.

Tones and colours are valuable in visual aids for the same reason, in that they can be used to determine the relative conspicuousness of the various parts of a picture. As a general principle backgrounds should be subdued, important objects should contrast strongly with them, and secondary objects should be intermediate. This scheme will of course be modified by the demands of natural colouring, but intense contrast should be used only at points which require notice, as brilliant details, even if small in size, can be very



Accuracy is relative. Any graphic represents a simplification of the original data and it may be stylized as in the map of the London Underground, which is geographically inaccurate, but topologically correct. If we are trying to teach a shape we must not distort it. If we want to show how certain items are connected, shape is irrelevant. Unnecessary accuracy is uneconomical. Accuracy must be related to educational purpose.

G. P. MEREDITH
Aeronautics



THE COLOUR CIRCLE

distracting. (Have you noticed the small spot on the left? Did it distract your attention from the text? Were you curious about it? Do you see how this principle can be (a) used, (b) abused, in visual aids?)

Maximum contrast of *tone* exists, of course, between black and white, or between a light and a dark shade of a colour. Maximum *colour* contrast is found between colours which are situated opposite to one another on the colour circle (see diagram, p. 25). The contrast of colour and tone can be varied independently or together. For example:

Maximum tone contrast — dark green/pale green.

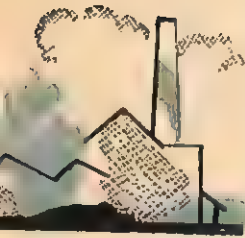
Maximum colour contrast — green/red.

Maximum total contrast — pale green/dark red,
or dark green/pale red (pink).

The more tones of one colour are used, the less contrast there is between them, and this gives a dull picture. This applies particularly to greys in a black-and-white picture. The same effect is found in a picture in which all the colours are equal in tone. On the other hand, if the whole picture is broken into sharply contrasting areas a dazzling effect is obtained and there is a tendency to see each area separately from adjacent ones, whether they are parts of the same object or not, because the boundary line between the colours is more obvious than the outline of the object. This effect is very widely used both in natural and military camouflage.

Tones, without the addition of colour, are in many cases adequate to make a clear picture, but colour, both natural and arbitrary, carries extra advantages of which its attractiveness is not the least. Colour keys are a familiar device in maps and diagrams and the colours are much easier to pick out than one shade of grey among others. Identification of the various parts by means of written labels is often even less desirable as the words do not define the boundaries within which they apply as colours do, and they are much more liable to be confused. (We have coloured traffic lights because the indication is so quick and sure.)

Colour is, of course, a natural property of all objects, and its inclusion in visual aids is desirable if only for that reason, for visual aids, except models, have no weight or tactile value; except in films, movement and the time factor are lacking, and usually sound also. To omit colour is to depart one degree further from reality



and thereby lose a little more of the quality of the original. It is not only pictures which owe their vividness to colour; an astonishing amount of descriptive poetry and prose is 'coloured' also:

Stiff flags straining in the night-blasts cold
In the gloom black-purple, in the glint old-gold,
Torchlight crimson on the copper kettle-drums, . . .
CHESTERTON

Old ships . . .
Questing brown slaves or Syrian oranges
. . . Painted the mid-sea blue or shore-sea green
Still patterned with the vine and grapes in gold.
JAMES ELROY FLECKER

Glory be to God for dappled things—
For skies of couple-colour as a brindled cow;
For rose-moles all in stipple upon trout that swim.
GERARD MANLEY HOPKINS

We have become accustomed to black-and-white pictures through the sheer necessity imposed by the technical limitations of the early stages of both printing and photography. Since these are now very largely overcome (except possibly from the economic point of view). It would seem a great pity not to use colour whenever possible. This is not to say that colours should be used so blatantly that they are obtrusive and distracting, nor indeed should any other aspect of technique. A satisfactory and pleasing picture is one in which the various elements are properly adjusted to each other and all subserve the theme of the artist.



FILMSTRIP CONTINUITY: Sub-titles divide the strip into two sections. The first picture indicates the location of the flower on the plant; frames 3, 4 and 5 show the parts of the flower in progressively greater detail; and their functions are dealt with in 5 and 6. There is no new information in 7, which summarizes the previous frames in a different form. 8 shows the flower without labels so that it can be used as a basis for questioning and also as an introduction to the floral diagram in 9. The second section follows the same pattern. The strip is produced in Dufaychrome. (See ch. 4).

SECTION TWO

Production



3

WALL-PICTURES AND CHARTS

Mounted Materials

A VALUABLE PERSONAL COLLECTION of pictures, specimens and photographs will be much better preserved and more attractive in appearance if it is suitably mounted, either on separate mounts for reference and individual examination, or on sheets for wall display.

It is best to stick single pictures and small specimens, such as samples of materials or pressed plants, on cards which should be rigid and stout enough to withstand much handling. A uniform size facilitates filing and index cards may be found convenient for this purpose. When complete they can be protected by a transparent covering, but do not forget to enter names and full particulars on each card before covering it.

There are various methods of protecting the material:

1. A coat of varnish.
2. Cellulose acetate sheets, cut to the same size as the card and attached by means of adhesive binding tape, or passe partout.
3. The card can be covered with strips of transparent cellulose adhesive tape. This is a particularly good method of securing small botanical and other specimens as the colours are often well preserved by this means.
4. Thin cellophane can be used in a manner similar to that employed for covering jam-pots. The cellophane must be larger than the mount itself, and is dampened *on one side only*. The dry side is then applied to the card, the edges folded over to the back and fastened with gummed tape. The cellophane will shrink as it dries, becoming tightly stretched to give a firm, flat surface. Only rigid card should be covered in this way, otherwise the shrinking of the cellophane will cause it to bend.

Tough paper, such as pastel paper or thin card, should be used as a foundation, and dog-eared corners can be prevented by applying strengthening bands to the top and bottom edges. Strong adhesive tape will do, and can be applied to the back if it interferes with the material on the front, but a still better method is the following: bands of thick paper are used, their length equal to the width of the wall-sheet and their width an inch or two more than is required to show on the front. These are then gummed into position along the edges of the sheet and the extra width folded over to the back and also gummed. This gives a treble thickness at the corners where most damage is caused by drawing pins and it improves the appearance of the wall-sheet as well.

Wall-Mounts





TOP: a case of mounted fruits. BOTTOM: a wall-sheet showing methods of mounting pictures for wall display, individual reference and the episcopes. The subject of the pictures is building, and brick-patterned paper has been used as a background.

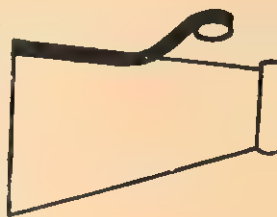
A title can be incorporated into the head band and for sheets of the 'diary' type a heading made of rigid cardboard instead of paper is useful as it need not be gummed into position but can be held by the pins alone so that succeeding sheets can be inserted underneath it. Successive sheets of different colours will emphasize the change. Wall-sheets can be made more attractive by the use of appropriate background material, for example, the brick paper used for covering doll's houses for a sheet on housing, or cotton print for a chart on the cotton industry.

Long sheets for panoramas, time-charts, etc., are most conveniently made from rolls of cartridge or wall-paper with a reel of gummed tape applied to the edges to prevent tearing.

Careful selection and arrangement of pictures is necessary. The material should first of all be cut out and assembled and then laid on the paper and shifted about until the most satisfactory arrangement is found. Corresponding items, such as the members of the same generation in a family tree, should of course all be placed on the same level. Any unwanted material should be trimmed away. Variety of shapes is pleasing, provided it is not overdone, and it is sometimes helpful to cut a picture out of its background or to place small items on a surrounding mount.

Captions can be hand- or type-written and linking lines, arrows and other details can either be cut from gummed tape or drawn with Indian ink in a wide lettering nib. It is sometimes wise to label the links as well as the pictures.

Pictures for the episcopes which are always used in the same order can be mounted on a paper strip which can be drawn through the episcopes one picture at a time and folded away when not in use. A covering cellulose acetate sheet will prevent the edges of the pictures from catching as they pass through. Children can contribute pictures to a story strip of this type and afterwards see them projected on the screen, and sometimes it is useful to project material intended for a filmstrip in this way in order to judge its appearance on the screen before having it photographed.



Wall-Pictures and Charts

A good wall-picture is a large-scale drawing comparable to a blackboard drawing or a poster. The following method of preparing wall-pictures is one of the quickest and simplest ways of producing a visual aid. Its advantage over a blackboard drawing is, of course, that it can be prepared before the lesson and kept for further use afterwards, and it is therefore a false economy to use flimsy paper for this work. Stout cartridge will do; card is better because it does not crease so readily, but it cannot be folded for storing, although the thinner types can be rolled and are still sufficiently rigid to retain a smooth surface. The edges may be strengthened in the manner already described for mounted materials. The paper should be smooth and must be white or cream because transparent colours are used and these will be altered if the background colours show through.

The drawing may either be made directly on to the sheet in pencil or on a separate piece of paper and transferred afterwards by means of carbon paper. It should be on a large scale similar to that used for blackboard work and excessive detail should be avoided. Space should be allowed for lettering about two inches high.



Felt
Brush



When the drawing is satisfactorily completed, the lines are traced over with Indian ink, using a brush or pen which will give a wide stroke. A 'felt brush', which has a pad of felt instead of bristles, is not costly and can be obtained from artists' suppliers. The 'Flomaster' is a felt-tipped instrument of the fountain-pen type and is admirable for this work.



Lettering may be inserted at this stage, using Indian ink, or it may be done on separate rectangles of paper of the same type as the background and stuck on afterwards with perhaps a neat and not-too-obtrusive outline to camouflage the edges.

The Indian ink outline must be thoroughly dry before colouring is attempted. Once dry, the Indian ink is waterproof and will not smudge when colours are applied. Coloured writing inks give excellent results (waterproof varieties should be used for outdoor posters and notices). For paler shades they should be diluted with water, and this will also make them easier to apply evenly. Watercolours can also be used, and photographic tinting colours, which can be obtained in the form of small booklets with dye-impregnated leaves which give a colour wash when soaked in water. Where large plain areas have to be filled in with colour it may be found easier to apply it with a wad of cotton-wool rather than with a brush. These colours can be filled in quite freely as the wide black outlines will obliterate any irregularities at the edges. This is not the case when opaque colours, such as poster paints, are used, and these, therefore, are not recommended for this purpose.



1851



Chart drawn in inks.

Cut-out paper figures are particularly suitable for charts requiring the repetition of identical symbols, such as pictorial graphs, maps, and so on, because a number of figures can be cut out at one time and this is much quicker than repeated tracing and painting.

A firm, smooth-surfaced background sheet is again required, but for this work it may be any colour. If ready-gummed, coloured paper is used, no glue, inks, or paints need be involved in the work.

WALL-PICTURES AND CHARTS

Figures for the chart may be produced in two ways: a 'realistic' outline can be traced from a photograph or drawing, or a figure may be constructed from geometrical shapes.

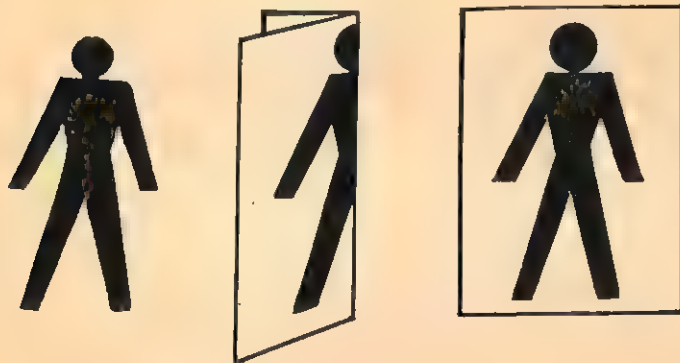


'Geometrical' Pig.



'Realistic' Pig.

If a traced outline is used care must be taken to ensure that it will disclose the nature of the subject and not become a mere shapeless blob when the other details are omitted. Additional details can be drawn on the cut-out forms, but this will add considerably to the work involved. In designing figures for this method it is well to remember that straight lines are easier to cut out. Symmetrical figures should be cut from paper folded down the centre so that both sides are the same.



To ensure that the figures are all alike either a paper pattern can be used or a stencil of cardboard, or cellulose acetate sheet, with the figure cut out of the centre, so that the outline can be quickly traced on the top sheet.

A basic figure, such as a man, can be varied by the addition of subsidiary details, but these should only be included for a definite purpose, to indicate additional

facts which have a bearing on the subject of the lesson. The same figure can also be produced in a number of colours to indicate different categories.

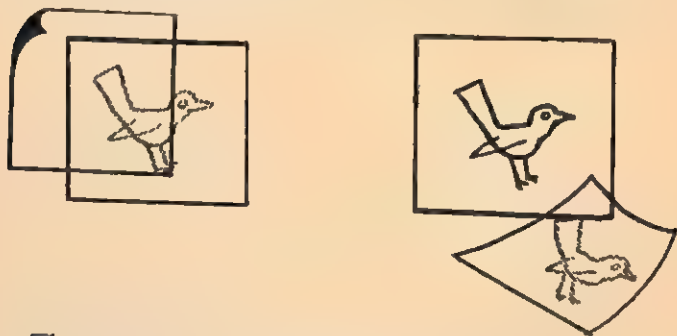


The figures should be at least three inches high and if large numbers of them are involved they should be divided into groups of fives, tens, or dozens for ease of counting and comparison.

This method can also be used for producing wall-pictures and friezes. If the picture is elaborate it should first be drawn on tracing paper:

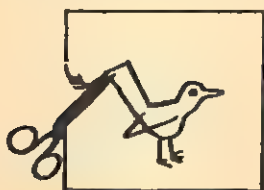


Both the tracing and the paper from which the figure is to be cut are reversed:



The tracing is placed on top and traced by means of carbon paper on to the *back* of the coloured paper:

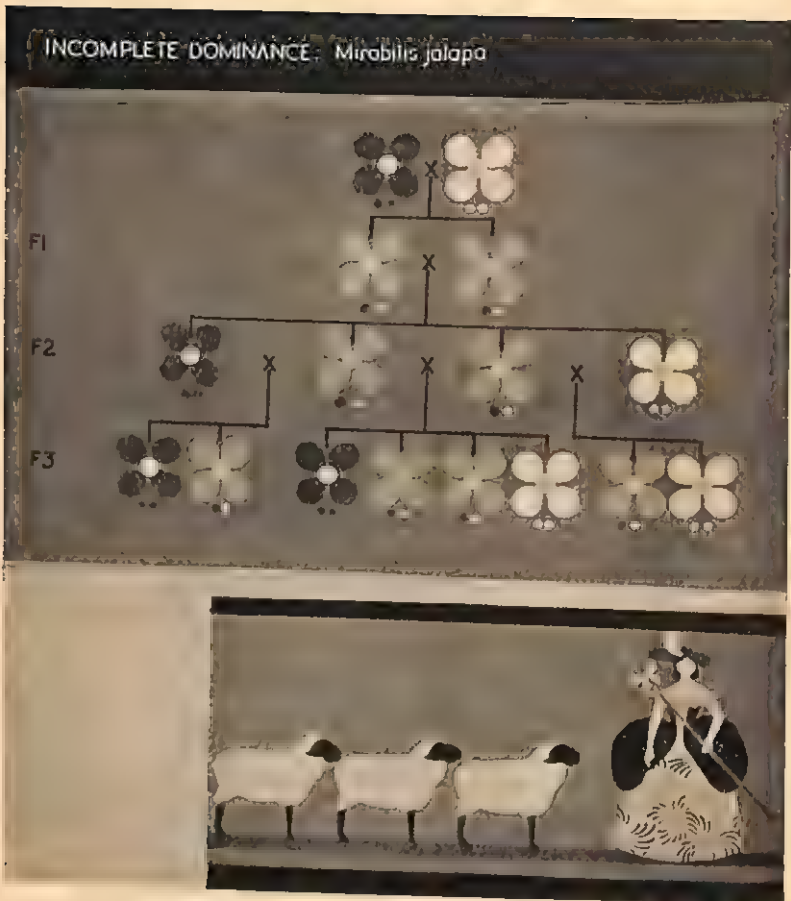
The lines will then not show when it is cut out and stuck into position:



Sections of a figure can be cut from different papers if required. A very decorative effect can be produced, and a saving of time is also effected, by using papers which are already printed with a design or texture. Veneer papers, wall-papers, metallic papers and foils, brick and tile papers supplied for model railway construction and doll's houses, paper d'oyleys ('lace'), fancy papers of all kinds, graph paper and other rulings, cellophane, are all useful.

Confetti made from gummed paper in a paper punch can be quite astonishingly useful for a variety of purposes, including dotted lines.





A chart and a section of a frieze made of coloured paper cut-outs.

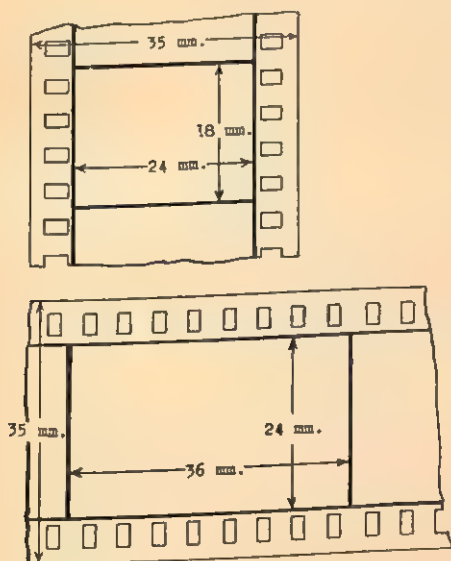
4

FILMSTRIPS

THE FIRST ROUGH DRAFT of a filmstrip is most conveniently prepared as a series of small sketches which can be put together in the order in which they are to appear, arranged, and replaced until they are considered satisfactory. The content of the pictures and their continuity are the most important considerations at this stage. When the drafting is completed and the content of each frame decided upon, photographs or drawings of the correct size must be made.

In preparing drawings it is convenient to first make pencil drawings on paper and then transfer them on to thicker cards which are painted, captioned, and photographed. In the pencil drawings layout and lines must be accurate as adjustment after this stage will be difficult, but it is not necessary to put in lettering so long as sufficient space is allocated for it, and the picture need not be coloured. Regular lines should be drawn with ruler, compass, and squares, and particular care should be taken to ensure that horizontal and vertical lines are accurate.

Dimensions



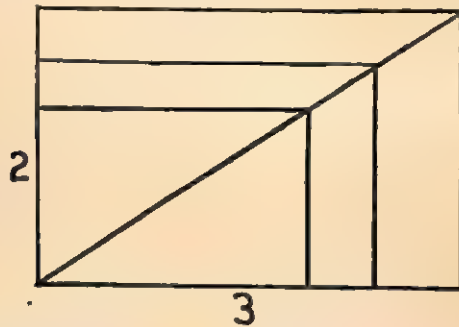
The *proportions* of these pictures are:

Single frame — 3 : 4

Double frame— 2 : 3

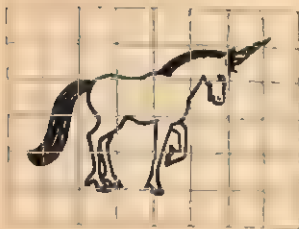
The *size* of the drawings to be photographed is immaterial provided that they conform to these proportions and are of uniform dimensions. If the pictures are not of uniform size, additional work is involved in adjusting the camera to accommodate them and an extra charge will be made for this if the work is done commercially. $7\frac{1}{2} \times 10$ in. is a size commonly used for single-frame filmstrips.

In adjusting drawings to the correct size it is useful to remember that rectangles sharing the same diagonal are of the same proportions.



Enlarging and Reducing Drawings

Drawing enlarged or reduced copies is made much easier if both the original picture and the sheet on to which it is to be copied are divided into equivalent sections, which can be copied one at a time.



The lines can be drawn on cellulose acetate sheet or tracing paper and laid over the original if it must not be marked.

As a rough guide, the contents of each original picture (on a $7\frac{1}{2} \times 10$ in. card) should be clearly visible at a distance of four or five feet. Lines and letters should be fairly bold and minute detail should be avoided. Maps should be simple, containing the principal features only. Lettering should be between $\frac{1}{4}$ and $\frac{1}{2}$ in. high. This means that about a dozen lines of lettering (approximately sixty words) is the maximum that it is possible to include, and considerably less than this is normally desirable.

The picture will usually occupy practically the whole of the frame space, and the background should be extended slightly beyond the area to be photographed so that no edges will show in the finished strip. No important matter should be placed within about half an inch of the edge, where it is in danger of being cut off when photographing, and captions and labels should be well clear of other objects. Stationary objects which appear in several pictures must occupy the same position in each one; this can be ensured by making one master drawing and taking several tracings from it.

When the drawings are complete, the pictures are transferred on to the final cards which will be painted and photographed. These should preferably be rigid cardboard about one inch larger than the picture on all sides. White backgrounds should be avoided as they are very glaring when projected, and black or grey card should therefore be used. A coloured card will appear grey when photographed but it is more difficult to judge the depth of tone beforehand.

If the cards are a light colour the pictures can be traced on to them with carbon paper, using the grade of carbon paper sold for typewriting (carbon paper for hand-writing is very thick and waxy and the lines are difficult to obliterate). If the background is black or dark, the tracing can be done by means of chalk rubbed on the back of the drawing. This should be applied thinly and loose chalk brushed off before tracing. A stylus or sharpened wooden point is useful for tracing as it does not blunt so readily as a pencil and therefore gives a finer line.

Painting is done with black, white and grey poster colours. Black and white can be mixed to give various

Layout

Backgrounds

Tracing

Painting

shades of grey, or a range of ready-mixed greys supplied for photographic retouching is obtainable. The number of greys used should be limited to three or four as there will otherwise be too little contrast between them. For pure black and white a special grade of poster paint, known as 'Process colour' is preferable as the colour reproduces more accurately, but this does not mix well. These are all water paints, but are opaque and must not be confused with ordinary water-colours which are transparent and therefore unsuitable for this work.

The paints should be of a fairly thick consistency when applied so that they are fully opaque. They may be painted one over another so long as the first coat is allowed to dry before the second is added. Indian ink should never be used with these paints as it will flake off when dry.

A good brush, preferably sable, is a sound investment for this work, and a ruling pen and compass is useful.

If it is necessary to show a number of objects on the same background in successive pictures, or a series of minor additions to a main picture, the extra parts can be drawn on sheets of 'cel' (cellulose acetate) which are laid over the original drawing. The cels must be absolutely clear and free from blemishes.

When this method is used it is essential to ensure the correct registering of the separate parts of the picture. This is usually done by means of standard perforations in drawings, paintings, and cels, which fit standard pegs on the drawing board and camera platform. The cels must be quite clean and polished and the picture can either be painted on the upper surface with poster paint, or the outline can be traced in Indian ink on the upper surface and the paint applied to the back. Indian ink and paint must not be put on the same side. If there is any difficulty in applying it smoothly, the cel should be thoroughly cleaned and a very minute amount of detergent put in the painting water. Cel sheets also provide a useful means of masking out unwanted parts of a picture.

When the painting is finished, lettering can be added (see next chapter). There are several methods of inserting captions. They can be painted straight on to the picture or on a cel overlay, but probably the easiest method is to do them on a separate sheet of paper and then cut out panels, with a margin of about one-eighth of an inch round the lettering, which can be stuck on to the picture.

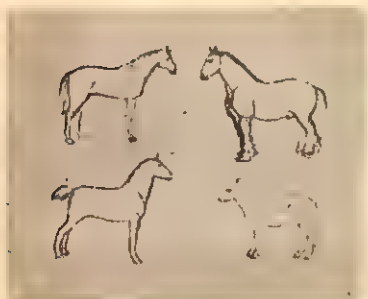


A GOOD BRUSH

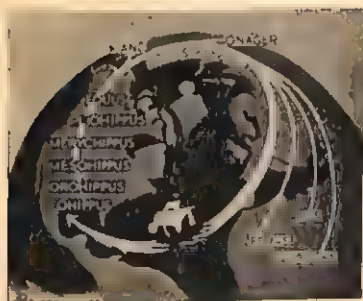
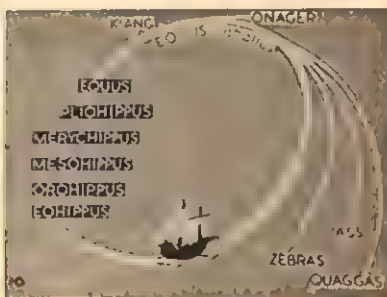
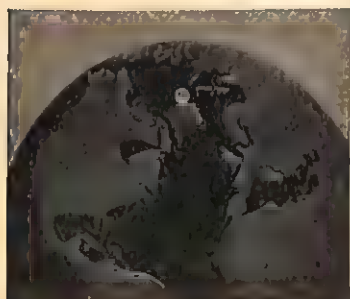
1. Has a fine point when wet.
2. Has resilient bristles.

FILMSTRIPS

When all the material is ready, it should be numbered and carefully packed in the correct order (including all titles, credits, etc., and masks for any pictures of which only a section is to be reproduced). A list of frames should be made in the order in which they are to be photographed and any special instructions to the photographer should be prominently indicated.



Rough drawing and final painting for a frame in the filmstrip 'Evolution of the Horse'.



Painted map on card and lettering on cel when combined form a further diagram for the same filmstrip. Lettering on cel in this case facilitates translation.



Filmstrip produced by teachers at a vacation course of the National Federation of Educational Film Groups. Each member of the course contributed one frame.

5

LANTERN SLIDES

LANERN SLIDES of simple pictures or diagrams can be hand-drawn.

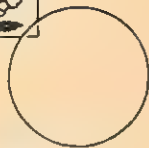
The standard sizes of lantern slides in this country are $3\frac{1}{4}$ by $3\frac{1}{4}$ in. and 2 by 2 in. A pencil drawing is first made on paper within a square of the proper size allowing a margin for binding round the edges. The drawing is then traced either directly on to a slide cover glass or on to cellophane. If cellophane is used it is essential that it should be waterproof cellophane. This feels slightly tacky when tested between moistened fingers, whereas if it is not waterproof it will feel slimy. (The cellophane sold for covering jam jars is always waterproof.)

Tracing is done with Indian ink in a fine mapping pen, and when it is dry the picture can be coloured with inks. If there is any difficulty in applying ink or colour the base should be cleaned and a very small trace of detergent in the water may help to make the ink flow smoothly. It is possible to draw in the same way on blank 35 mm. filmstrip base, but the picture area is so small that only very simple pictures can be made this way.

The cellophane drawing is then placed between two slide cover glasses and trimmed to the correct size, and the 'sandwich' is then bound together. Crinkles in the cellophane will not show in the projected picture. If the drawing has been made on glass it must still be covered to protect it from scratching.

For binding, a strong but smooth gummed tape is required, about half an inch wide. This is pressed on to the edges of the glass in the manner shown in the diagram. The corners are then trimmed and the edges pressed into position. A small spot on the bottom left-hand corner will help the operator to orientate the slide correctly. When inserting it into the projector, the spot will be held under the right thumb. This is yet another use for gummed paper 'confetti'.

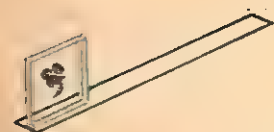
Lettering on slides can be produced in two ways:
Liquid Opaque. This can be used for writing on a slide with an ordinary pen, or the slide can be coated



Lettering

with opaque and the lettering scratched into it with a sharp pointed instrument when it is dry.

Typewritten Slides. A piece of cellophane is placed between two sheets of carbon paper with the carbon



surface of both pieces facing inwards, next to the cellophane. In this position they are inserted into the typewriter, and the wording is typed with the ribbon set at neutral as for stencil cutting. By this means an impression is transferred to both sides of the cellophane sheet, which is then mounted. Care must be taken not to rub off the carbon in handling.

LETTERING

THE MOST IMPORTANT CONSIDERATION in the choice of lettering is legibility and this is influenced by a number of factors, including size, illumination, style, boldness, colour, background, spacing and the eyesight of the reader. The principal factors under the control of the designer are:

Size and boldness.

Shape and proportions of the letters (style).

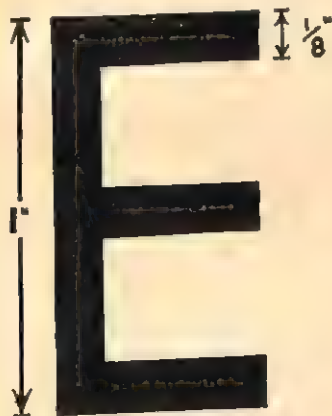
Spacing.

Size is the most important factor in determining legibility, but the others are by no means negligible. The visual size of lettering is inversely proportional to the reading distance, and the accompanying table (page 52) shows letters which, at distances of ten and twenty feet, are comparable to the sizes of printers' type shown in the first column when these are held at normal reading distance (14 inches). The smallest of these, 6-point type (72 points = 1 inch), is approximately the smallest type that can be read and to do so involves some considerable strain; experiments suggest that maximum legibility is obtained with 14-point type, but above this size the increase in legibility is relatively smaller.

A letter of average boldness has a stroke approximately one-eighth of its height:

Size

Boldness



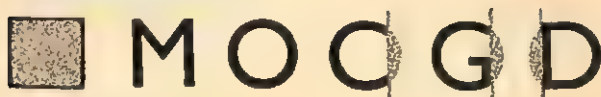
The width may be constant or varied, but thin portions should not be allowed to become too narrow or they tend to 'disappear' when viewed from a distance and this interferes with reading. The variation in stroke width is derived from the thick and thin strokes obtained in pen lettering, and the thin strokes are therefore those which would be made in an upward direction if drawn with a pen, for example, the left-hand side of A and the right-hand side of U.

For easy reading, the classic letter forms should be adhered to. This does not mean that lettering should always be of a uniform style, but distortion of the basic shapes and proportions should be avoided.

Proportions

LETTER PROPORTIONS

"SQUARE" letters



$\frac{3}{4}$ -SQUARE letters



$\frac{2}{3}$ -SQUARE letters



$\frac{1}{2}$ -SQUARE letters



Within this limitation there is room for a great deal of variation in style and the use of two contrasting styles will often alleviate the monotonous appearance given by entirely uniform lettering. It has been shown that lower-case letters are easier to read than capitals.

In spacing letters, the aim is to obtain an all-over evenness of appearance, having no large blank areas nor heavily crowded portions. It is impossible to lay down an exact guide because each letter is a different shape and therefore no two combinations are the same, but as a general rule 'straight' letters should be more widely separated than 'round', and a 'straight' with a 'round' intermediately.

Spacing



Spacing between words and lines should not be too wide as the whole passage will then lack coherence, but clearance of ascenders and descenders must, of course, be allowed for.

For good, quick results one of the patent pens or stencils can be recommended:

Patent Pens and Stencils

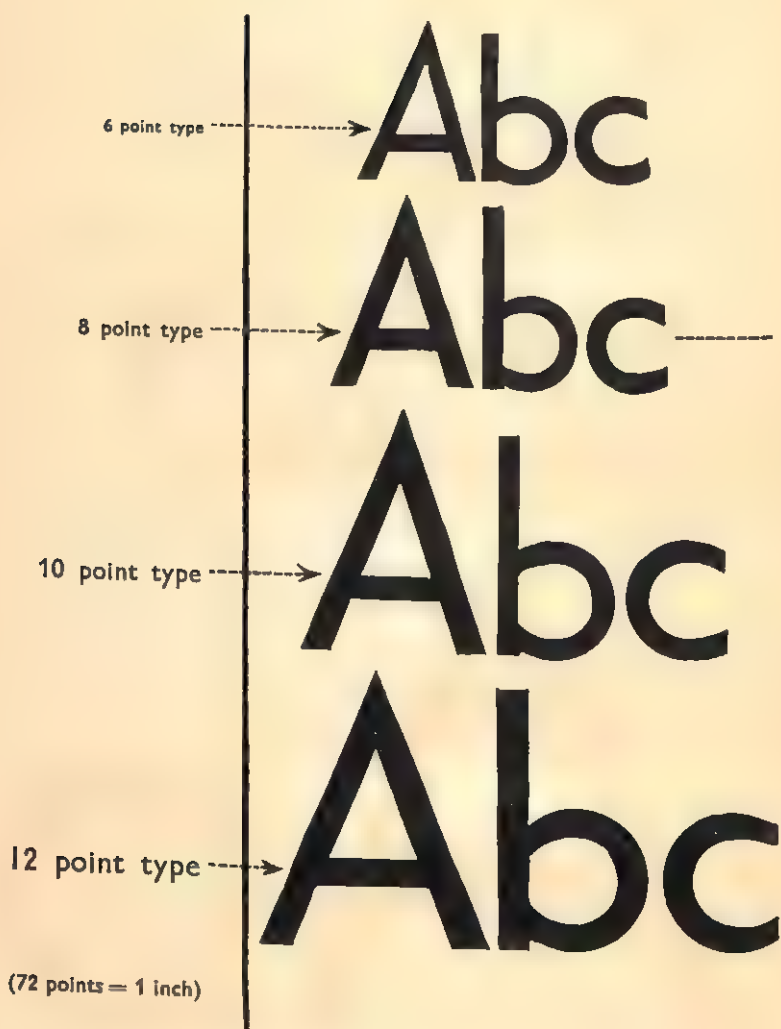
Lettering Pens. These are pen-nibs, used in an ordinary holder, which give a very wide stroke, up to about a quarter of an inch, according to the size used. They are often provided with a special reservoir attachment which enables them to hold an adequate supply of ink. These pens are especially suitable for the production of a script type of lettering, which can be done quite quickly after a little practice.

Script letters

Uno Pen and Stencil. The Uno stencil is available in a number of sizes and styles, and it is necessary to use a pen of the appropriate size with each stencil. The stencils are made of transparent plastic and the central portion

LETTERING SIZES

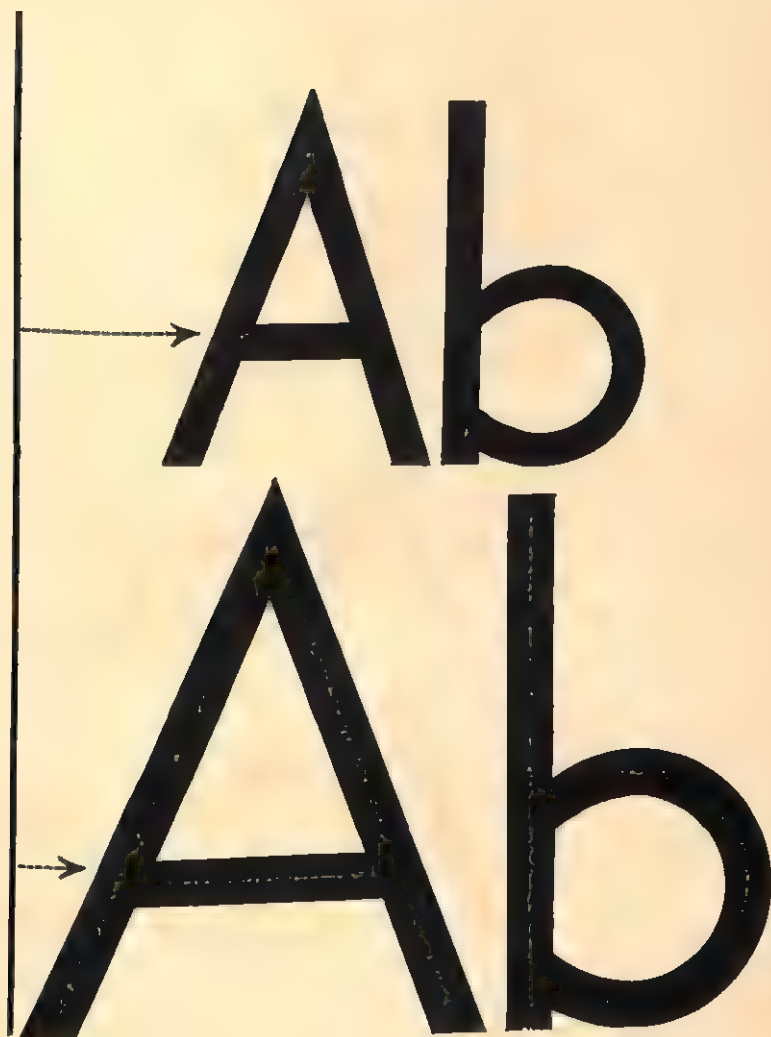
Visual equivalent at ten feet



LETTERING

The letters in the second and third columns, when viewed at ten and twenty feet respectively, are the visual equivalents of the types in the first column viewed at normal reading distance (fourteen inches).

Visual equivalent at twenty feet



is raised from the paper by thickened horizontal edges so that it can be moved backwards and forwards without smudging. When in use it is rested on a straight-edge, which should be firmly fixed in position.

The pen consists of a reservoir which is filled with ink or paint and an outlet tube which fits exactly into the stencil letters. When lifted from the paper the outlet is blocked by a wire plunger. This instrument is very simple to use, but the pen must be thoroughly cleaned after use so that it does not become blocked with dry ink.

Uno pen

Econasign Stencil. The Econasign stencil lies flat on the paper and a special quick-drying ink is applied through the perforated letters with a stencilling brush. These stencils are also available in various sizes and styles.

ECONASIGN

NOTE ON PREPARATION OF DRAWINGS FOR LINE BLOCK REPRODUCTION

DRAWINGS INTENDED FOR PRINTED REPRODUCTION by means of a line block should be prepared in black and white without any intermediate shades. The drawing can be made first in pencil on a smooth white paper or Bristol board, and then traced over with Indian ink. The ink should be applied with a brush wherever large black areas are required as a pen will roughen the surface, but the brush must be thoroughly washed out immediately after use or the dry ink will clog and distort it.

Since greys cannot be used, 'shading' must be suggested either by line 'hatching' (the lines regularly drawn) or by dots more densely placed to indicate darker shades and spread apart for lighter ones. The very fine lines of black and white appear to blend and give an illusion of grey. If the drawing is enlarged or brightly illuminated this illusion is destroyed, and for this reason, 'hatched' illustrations are not suitable for projected material. In any case it is then unnecessary to use this device, the purpose of which is only to overcome the limitations of line block printing; these do not apply to the camera which will register any number of shades of grey.

Drawings for line blocks are often made on a larger scale than the final print. They are reduced in the process of block making and small irregularities in the drawing are thus reduced; also it is easier to work on the larger original drawing. This does not involve any additional cost.

An alternative method of producing good black-and-white drawings is the use of scraper-board. This is card with a heavy, smooth, pipe-clay coating, obtainable in black, white, and a variety of stippled effects. On white board, the drawing is made in Indian ink and fine white details scratched in with a special instrument mounted



in a pen-holder. On black board the scratched lines produce a white picture. This process permits a fair amount of correction to be made to the drawing.



A scraper-board
drawing

Form No. 3.

PSY, RES.L-1

**Bureau of Educational & Psychological
Research Library.**

The book is to be returned within
the date stamped last.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

WBG-59/60-5119C-5M